

---

**Ancient evolutionary origin of the neural crest gene regulatory network.**

**Journal:** Dev Cell

**Publication Year:** 2007

**Authors:** Tatjana Sauka-Spengler, Daniel Meulemans, Matthew Jones, Marianne Bronner-Fraser

**PubMed link:** 17765683

**Funding Grants:** Training in Stem Cell Biology at CIT

**Public Summary:**

This paper describes the original research that showed that lamprey neural crest network genes were expressed in similar patterns and had similar functions to those in other vertebrates. The work represents a highly comprehensive view of neural crest stem cell formation in a basal vertebrate. The results suggest that the neural crest gene regulatory network was largely in place at the time that vertebrates evolved.

**Scientific Abstract:**

The vertebrate neural crest migrates from its origin, the neural plate border, to form diverse derivatives. We previously hypothesized that a neural crest gene regulatory network (NC-GRN) guides neural crest formation. Here, we investigate when during evolution this hypothetical network emerged by analyzing neural crest formation in lamprey, a basal extant vertebrate. We identify 50 NC-GRN homologs and use morpholinos to demonstrate a critical role for eight transcriptional regulators. The results reveal conservation in deployment of upstream factors, suggesting that proximal portions of the network arose early in vertebrate evolution and have been conserved for >500 million years. We found biphasic expression of neural crest specifiers and differences in deployment of some specifiers and effectors expected to confer species-specific properties. By testing the collective expression and function of neural crest genes in a single, basal vertebrate, we reveal the ground state of the NC-GRN and resolve ambiguities between model organisms.

---

**Source URL:** <https://www.cirm.ca.gov/about-cirm/publications/ancient-evolutionary-origin-neural-crest-gene-regulatory-network>